AMMONIA, ANHYDROUS
LINDE UNION CARBIDE

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.
(Essentially similar to U.S. Department of Labor Form OMB No. 1218-0072 and generally accepted in Canada for information purposes)
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LINDE UNION CARBIDE

I. PRODUCT IDENTIFICATION

PRODUCT	Ammonia, Anhydrous		
CHEMICAL NAME	Ammonia	**SYNONYMS**	Ammonia Gas, Spirit of Hartshorn
FORMULA	NH_3	**CHEMICAL FAMILY**	Alkaline Gas
		MOLECULAR WEIGHT	17.031
TRADE NAME	Ammonia, Anhydrous		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets. See Section IX.

MATERIAL (CAS NO.)	Wt. (%)	1988-1989 ACGIH TLV-TWA (OSHA-PEL)	
Ammonia (7664-41-7)	100	25 ppm	[Short Term Exposure Limit (STEL) 15 min. 35 ppm]

This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	−33.35°C (−28°F)	**FREEZING POINT**	−77.7°C (−107.9°F)
SPECIFIC GRAVITY (H_2O = 1)	0.6819 @ −33°/4°C	**VAPOR PRESSURE AT 21°C.**	114.1 psig
VAPOR DENSITY (air = 1)	0.597 @ 21°C	**SOLUBILITY IN WATER, % by wt.**	Appreciable
PERCENT VOLATILES BY VOLUME	100	**EVAPORATION RATE (Butyl Acetate = 1)**	High

APPEARANCE AND ODOR Colorless gas at normal temperature and pressure; pungent, irritating odor.

EMERGENCY PHONE NUMBERS

IN CASE OF EMERGENCIES involving this material, further information is available at all times:
In the USA 1-800-UCC-HELP (1-800-822-4357) In Canada 514-640-6400
For routine information contact your local supplier

Union Carbide Industrial Gases Inc. requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

Revised

UNION CARBIDE INDUSTRIAL GASES INC.
LINDE DIVISION

JSC MSDS# 06069

L-4562-B

6830.00.000-5072

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING — An unlikely route of exposure. This product is a gas at normal temperature and pressure, but may cause chemical burns of the mouth, throat, esophagus, and stomach.

SKIN ABSORPTION — Prolonged or widespread skin contact may result in the absorption of potentially harmful amounts of material.

INHALATION — Overexposure to concentrations moderately above the Threshold Limit Value (TLV) of 25 ppm may cause irritation of the eyes, nose, and throat. Higher concentrations may cause breathing difficulty, chest pain, bronchospasm, pink frothy sputum, and pulmonary edema. Overexposure may predispose to the development of acute bronchitis and pneumonia.

SKIN CONTACT — Liquid may cause, depending on the degree and duration of contact, moderate to severe redness, swelling and ulceration of the skin. Exposure to gas at high concentrations may cause chemical burns.

EYE CONTACT — Liquid may cause pain, severe redness and swelling of the conjunctiva, damage to iris, corneal opacification, glaucoma, and cataract. Exposure to gas may cause pain and excessive tearing, with acute corneal injury at high concentrations.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Chronic exposure may cause chemical pneumonitis and kidney damage.

OTHER EFFECTS OF OVEREXPOSURE: None currently known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. The skin irritating properties of the material may aggravate an existing dermatitis.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING — This product is a gas at normal temperature and pressure. Rinse mouth with water. Give at least 2 glasses of water or milk at once. Do not induce vomiting. Call a physician.

SKIN CONTACT — Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard clothing and shoes. Call a physician.

INHALATION — Remove to fresh air. Give artificial respiration if not breathing. Oxygen may be given when necessary. Keep patient warm. Call a physician.

EYE CONTACT — Immediately flush eyes with water and continue washing for at least 15 minutes. The eyelids must be held open and away from the eyeball to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN:
Victims of overexposure should be observed for at least 72 hours for delayed onset of pulmonary edema.

The hazards of this material are mainly due to its severe irritant and corrosive properties on the skin and mucosal surfaces. There is no specific antidote, and treatment should be directed at the control of symptoms and clinical condition.

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Flammable Gas	**AUTOIGNITION TEMPERATURE**	651°C (1204°F)
FLAMMABLE LIMITS IN AIR, % by volume	**LOWER** 15%	**UPPER**	28%

EXTINGUISHING MEDIA: CO_2, dry chemical, water spray or fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Reduce corrosive vapors with water spray or fog. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable, toxic, corrosive gas. Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable and corrosive vapors may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with appropriate device. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F).

NOTE: *Reverse flow into cylinder may cause rupture (see Section IX).*

VI. REACTIVITY DATA

STABILITY	
UNSTABLE	**STABLE**
	X

CONDITIONS TO AVOID: See Section IX.

INCOMPATIBILITY (materials to avoid): Gold, silver, mercury, oxidizing agents, halogens, halogenated compounds, acids, copper, copper-zinc alloys (brass), aluminum, chlorates, zinc.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen may be formed at temperatures in excess of 840°C in the absence of air and oxygen. The normal products of combustion are nitrogen and water.

HAZARDOUS POLYMERIZATION	
May Occur	**Will not Occur**
	X

CONDITIONS TO AVOID: None currently known.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Immediately evacuate all personnel from danger area.

DANGER: Flammable, corrosive, toxic gas. Forms explosive mixtures with air (see Section V). Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray.

NOTE: *Reverse flow into cylinder may cause rupture (see Section IX). Shut off leak if without risk. Ventilate area of leak or move leaking container to well ventilated area. Prevent runoff from contaminating surrounding environment. Flammable, corrosive, toxic vapors may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.*

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Keep personnel away.

Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with Federal, State and local regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type) — Select in accordance with OSHA 29 CFR 1910.134 and ANSI Z88.2. For concentrations up to 10 times the applicable exposure limit any NIOSH/MSHA approved supplied air respirator is recommended. Up to 50 times a NIOSH/MSHA approved respirator with a full face piece or self-contained breathing apparatus is recommended. For higher concentrations use only self-contained breathing apparatus operated in the pressure-demand mode.

VENTILATION	**LOCAL EXHAUST** — Explosion-proof, corrosion resistant system is acceptable.
	MECHANICAL (general) — Inadequate. See SPECIAL.
	SPECIAL — Use only in a closed system. Explosion-proof, corrosion resistant, forced draft fume hood is preferred.
	OTHER — Not applicable. See SPECIAL.

PROTECTIVE GLOVES: Neoprene.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Safety showers and eyewash fountains.

IX. SPECIAL PRECAUTIONS

DANGER: Toxic, corrosive, flammable, liquefied gas under pressure.

Do not breathe gas. Do not get liquid or vapors in eyes, on skin or clothing (see Section IV). Safety showers and eyewash fountains should be immediately available.

Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air. Keep away from heat, sparks and open flame. Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times. Keep away from oxidizing agents. Use only in a closed system constructed of corrosion-resistant materials. Close valve when not in use and when empty.

NOTE: *Reverse flow into cylinder may cause rupture. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow.*

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product.

Remember, gases and liquids have properties which can cause serious injury or death.

Be sure to read and understand all labels and other instructions supplied with all containers of this product.

NOTE: *Compatibility with plastics should be confirmed prior to use.*

For safety information on general handling of compressed gas cylinders, obtain a copy of pamphlet P-1, "Safe Handling of Compressed Gases in Containers" from the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

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LINDE DIVISION

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